UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/595,583	06/15/2000	John D. Mize	30-5074(4015)	9989

7590 02/26/2004

David G. Latwesen, Ph.D.
Wells, St. John
601 West First Avenue
Suite 1300
Spokane, WA 99201

EXAMINER	
GAKH, YELENA G	

ART UNIT	PAPER NUMBER
1743	

DATE MAILED: 02/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/595,583	MIZE ET AL.
	Examiner	Art Unit
	Yelena G. Gakh, Ph.D.	1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-44 and 59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-44 and 59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 June 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *02/19/04* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. RCE and Amendment, filed on 01/20/04, are acknowledged. Claims 1-13 are cancelled. Claims 14-44 and 59 are pending in the Application. The following Office action follows the interview with Jennifer J. Taylor, held on 02/19/04, which left several unresolved issues.

Specification

2. The abstract of the disclosure is objected to because it does not clearly and definitely reflect the essence of the invention. The method of the present invention is directed specifically toward determining impurities in metal compositions by microscopic analysis. Correction is required.

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Method of determining impurities in metal compositions by microscopic analysis".

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 14-39 and 59 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for generating information on *undissolved* material after dissolving the composition, does not reasonably provide enablement for generating information on any other material contained in the composition. Further, the specification, while being enabled for generating information on "size, shape, type and quantity of undissolved material", with type relating to an oxide content and a carbon content, with light microscope, does not reasonably provide enablement for generating information about the type of material related to

its conductivity, when using light microscope. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. No one of ordinary skill in the art can determine the "size, shape, quantity or type" of a *dissolved* material using a microscope, or to determine the type of undissolved material related to its *conductivity* using the light microscope.

Moreover, according to the specification, the method is directed specifically toward determination of insoluble impurities in metal compositions. The specification does not provide any guidance on how to apply this method to the compositions, all ingredients of which can be dissolved, or which on the opposite mainly comprise insoluble components. The specification does not disclose any other possible compositions, which could satisfy criteria required by the method, i.e. to mainly comprise the material of known quality that can be dissolved, with the minor part to be analyzed remaining undissolved. It would have been an undue experimentation for any routineer in the art to find out, which compositions can satisfy such requirement.

Claims 40-44 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for "modifying a light absorbing property of at least some of the impurities retained on the substrate" by physically or chemically changing them, does not reasonably provide enablement for modifying the light absorbing property by any other way. The only way by which any routineer in the art can modify the light absorbing properties of compounds is by their physical or chemical modification, which is not recited in the claims.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 14-44 and 59 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The preamble of claim 14, which recites "a method of generating information about materials present in a composition" contradicts the body of the claim, which recites, "processing the ... data ... obtained by the microscope to generate information about one or more of the size, shape type and quantity of **undissolved** material ...". The preamble of the claim should be rewritten to correspond its body. Moreover, only metal oxides are disclosed in the specification.

It is not clear, if any other oxides can be detected by the method of the present invention. The same is true for claim 35.

Claim 14 further recites "a first depth of the composition", "a second depth of the composition". Since the composition, by definition, is just a mixture of several components, it is not clear how a dimensionless mixture can have a depth. The composition should form at least some shape to get a depth.

Claim 23-32 recite, "the solution comprises one or more metals" or recite, which metals are present in solution. It is not clear from the claims the way they are written, if the metals are dispersed in the solution, or *dissolved* (as metal cations), as recited in claim 21.

Claims 40-44 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: physical or chemical modification of undissolved impurities in order to change their light absorbing properties, the most essential step for enabling the method recited in the claims.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. **Claims 14-17, 21-34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Pavate et al. (US 6,001,227, IDS) in view of Meisburger et al. (US 5,502,306).

Pavate discloses a method of generating information about particulates present in a fluid by providing a substrate comprising a first shade; filtering the fluid through the substrate with the particulates retained on the substrate, thus providing a second shade; after filtering scanning across at least a portion of the **gridded** substrate using **optical [light] microscopy/SEM analysis**, with SEM being scanning electronic microscope, which gives digital images upon scanning of the substrate along the grid; the images are formed due to the contrast of two or more particulates relative to the substrate background. The information obtained is related to size, shape and distribution of particulates as a typical information on morphology obtained by SEM analysis. The contrast of the particles relative to the substrate background is due to response of particulates either to photons (light microscopy) or electrons (SEM). Pavate also indicates that "the inclusion **size distribution** *may be* determined using manual light microscopy techniques such as, ASTM F24 and F25"; however, disclosed SEM analysis inherently implicates the features of the method described above (col.2, lines 45-50).

Particularly, Pavate discloses measuring inclusion content of aluminum/copper targets by partially dissolving a sample target in HCl/HNO_3, filtering the solution through the substrate and determining the content of the undissolved inclusions, such as **metal oxides** (Al_2O_3), nitride precipitates, **carbide** precipitates by optical microscope/SEM analysis. The **silicon** content should be less than 1% by weight (col. 11, lines 38, 39). Filtering the solution through the gridded substrate (filter) leads to locating undissolved particulates along the grid.

Although Pavate does not specifically disclose comparing information obtained for the impurities derived for different portions of the composition ("depth profiling"), or specify other

types of metal sputtering targets besides Al/Cu, the importance of homogeneity for the sputtering targets is notoriously well recognized in the art; therefore it would have been obvious for anyone of ordinary skill in the art to compare the type and quantity of impurities for different parts of the sputtering target. Presence of different metal ions in solution depends on the metal composition of the targets, and is not a limiting step for the method, since all metal targets can be dissolved by the same solvent disclosed by Pavate. Therefore, it would have been obvious for anyone of ordinary skill in the art to obtain solutions with various dissolved metals depending on the type of the sputtering targets under analysis.

Pavate does not specifically disclose scanning across the substrate by automated displacement of the substrate relative to an observing portion of the microscope along a grid pattern.

Meisburger teaches electron beam inspection system and method comprising automated displacement of the substrate relative to the observing portion of the microscope.

It would have been obvious for anyone of ordinary skills in the art to use automated microscope of Meisburger, comprising means for automated displacement of the substrate relative to the observing part of the microscope, in Pavate's method, because this facilitates observing different portions of the substrate and makes analysis of undissolved components more efficient.

12. **Claims 35-36, 38-39 and 59** are rejected under 35 U.S.C. 103(a) as being unpatentable over Pavate in view of Meisburger, Dewey (US 3,674,926) and International Advanced Materials (IAM).

Pavate discloses a method of generating information about materials present in a composition by providing a composition (a sputtering target); utilizing a reagent (HCl/HNO_3) to dissolve at least a portion of the composition; filtering he mixture through a substrate (filter) with undissolved components retained on the substrate, the components being of at least two types – metal oxides (Al_2O_3) and carbides; scanning across the substrate with light microscope or SEM; obtaining digital image to obtain information on the content of the particulates based on their contrast relative to the substrate.

Pavate does not specifically disclose scanning across the substrate by automated displacement of the substrate relative to an observing portion of the microscope along a grid pattern.

Meisburger teaches electron beam inspection system and method comprising automated displacement of the substrate relative to the observing portion of the microscope.

It would have been obvious for anyone of ordinary skills in the art to use automated microscope of Meisburger, comprising means for automated displacement of the substrate relative to the observing part of the microscope, in Pavate's method, because this facilitates observing different portions of the substrate and makes analysis of undissolved components more efficient.

Pavate in view of Meisburger do not specifically disclose generating information about at least two different types of undissolved components by light microscope, with one type being darker than the background and the second being lighter than the background. However, Pavate's method intrinsically comprises obtaining two types of particulates with different shades relative to each other, since both types of such components, namely metal oxides and carbides, are disclosed by Pavate.

Dewey discloses "feature counter with improved masking and grey level detection" in scanning microscope, wherein the counter groups the particulates according to their lighter or darker shade relative to the background or wherein the grey level can be optimized, so that their "light absorbing properties" are changed (Abstract, col. 1).

It would have been obvious for anyone of ordinary skill to modify Pavate-Meisburger's method, which intrinsically comprises generating information on lighter and darker types of undissolved components by implementing Dewey's counter, which changes the gray level detection and thus makes separation of two different types of impurities much more visible.

Pavate in view of Meisburger and Dewey do not disclose compositions comprising at least one of Sb, Pb and Sn.

IAM discloses sputtering targets comprising Sb, Pb or Sn.

It would have been obvious for anyone of ordinary skills in the art to apply Pavate-Meisburger-Dewye's method to IAM's targets, because they belong to the same class of

sputtering targets as Pavate's compositions and are the subjects of the same quality control as the targets disclosed by Pavate.

13. **Claim 37** is rejected under 35 U.S.C. 103(a) as being unpatentable over Pavate in view of Meisburger, Dewey and IAM, as applied to claims 35-36, 38-39 and 59 above, and further in view of Kitamura .

Pavate in view of Meisburger, Dewey and IAM do not particularly disclose displaying results as a histogram.

Kitamura teaches a particle analysis method "performed with a **scanning type electron microscope** which directs a narrow, focused electron beam through an electromagnetic lens onto a surface of a sample mounted on a high precision stage in scanning, produces a detection signal representing intensity of secondary electrons or reflected electrons from the sample surface, and displays a representation of the sample surface based on the detection signal, the method comprising the steps of: reading the image by controlling the **electron microscope** by automatically shifting views produced by scanning the electron beam from a most probable spot where particles may exist to less probable spots in sequence based on information contained in the signal of coordinates of a particle location; determining the particle detection location and acquiring a detection evaluation value in the image, under the assumption that the normal distribution portion of a **histogram** of detection intensity is due to a simple pattern and that the rest of the distribution of the histogram is due to a particle; and scanning a location where particles are determined to exist based on the result of the determining step" (col.1, lines 35-58).

It would have been obvious for anyone of ordinary skill to represent the results of Pavate-Meisburger-Dewey-IAM's method as a histogram, as taught by Kitamura, because it is a convenient way to represent the content of the composition, obtained by optical microscopy/SEM analysis.

Response to Arguments

14. Applicant's arguments filed 1/20/04 have been fully considered but they are not fully persuasive.

Regarding rejection of the first group of claims 14-34, the examiner would like to notice that indications of importance of homogeneity of sputtering (metal) targets are so numerous, and the importance of it so notoriously well recognized in the art, that it is out of a question that there is a direct motivation to test homogeneity of sputtering targets when analyzing their impurities (see, e.g. Pechineyhighpurity.com). Comparing two different parts of the target ("depth profiling") in order to test its homogeneity is apparent for anyone of ordinary skill in the art, and therefore the method recited in claims 14-17, 21-34 is obvious over the prior art, as indicated above. The examiner did not quite understand the Applicant's question on how homogeneity of the target is related to the method disclosed in the prior art. Pavate's method is directed toward detecting and evaluating impurities in the sputtering targets, and the homogeneity of the sputtering targets is defined by the impurities distributed within them. It is not quite clear, why the relation between the homogeneity of the target and Pavate's method of detecting impurities is not apparent? It is also not clear, why the applicant doubts "a reasonable expectation of success" for the method, which uses the same procedure for two different portions of the target (composition) and compares the results?

The Applicant further expresses doubts in successful performance of the method applied for the metal targets comprising at least one of Sb, Sn or Pb. A mixture of HNO_3 and HCl, also known as "aqua regia", "is one of the few reagents able to dissolve gold and platinum", according to Encyclopedia 4U.com. It is not quite clear, why there is a doubt in successful dissolving of such "non-noble" metals, as Sb, Sn or Pb when using this reagent? On the other hand, this reagent does not dissolve metal oxides or carbides, which therefore can be analyzed as undissolved particles by light/electronic microscope, as disclosed by Pavate.

Regarding claims 40-44, the examiner admits misunderstanding the claims because of non-clarity of their recitation. The Applicant gave the correct interpretation of the claims, which will be allowed upon resolving the issues expressed above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (571) 272-1267. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Yelena G. Gakh
2/22/04